

Claims

What is claimed is:

1. A three-dimensional grid panel, comprising:

5 a) a plurality of continuous strands of fiber disposed in a repeating geometric pattern;

b) the strands crossing and attaching to one another at nodes positioned at an outer perimeter of the grid panel;

c) the strands forming discrete segments arranged sequentially with one another along the respective strands and extending between the nodes; and

10 d) the plurality of continuous strands of fiber being disposed in groups, including at least:

i) a first layer having at least two groups of spaced-apart strands oriented to transverse one another at the nodes;

15 ii) a second layer, spaced-apart from the first layer, having at least two groups of spaced-apart strands oriented to transverse one another at the nodes; and

20 iii) an intermediate layer, disposed between the first and second layers, having at least two groups of spaced-apart diagonal strands oriented to transverse one another at the nodes and extending transverse between the first and second layers and attaching the first and second layers together.

2. A panel in accordance with claim 1, wherein the first and second layers are substantially parallel.

25 3. A panel in accordance with claim 1, wherein the strands of fiber in the intermediate layer extend back and forth between the first and second layers.

4. A panel in accordance with claim 1, wherein the nodes of the first layer are off-set with respect to the nodes of the second layer.

30 5. A panel in accordance with claim 1, wherein the nodes of the first layer are aligned with respect to the nodes of the second layer.

6. A panel in accordance with claim 1, wherein the first and second layers each further include at least three groups of spaced-apart strands oriented to transverse one another at the nodes.

5 7. A panel in accordance with claim 1, wherein the first and second layers have a thickness substantially the same as a thickness of the strands.

8. A panel in accordance with claim 1, wherein the intermediate layer has a thickness greater than a thickness of either of the first and second layers.

10 9. A three-dimensional grid panel, comprising:

a) two spaced-apart grids, each having:

i) a first plurality of spaced-apart, elongated components including continuous strands of fiber;

15 ii) a second plurality of spaced-apart, elongated components, oriented transverse to the first plurality of components, and including continuous strands of fiber intersecting the continuous strands of fiber of the first plurality of components at nodes; and

20 b) an intermediate grid, disposed between and interconnecting the two spaced-apart grids, the intermediate grid having:

i) a first plurality of intermediate components, each extending between nodes of the two spaced-apart grids, and including continuous strands of fiber; and

25 ii) a second plurality of intermediate components, oriented transverse to the first plurality of intermediate components, and including continuous strands of fiber intersecting the continuous strands of fiber of the first plurality of intermediate components at nodes, each of the second plurality of intermediate components extending between nodes of the two spaced-apart grids.

30 10. A panel in accordance with claim 9, wherein the first and second plurality of intermediate components can include a plurality of sequential segments that alternate back and forth between the two spaced-apart grids.

11. A panel in accordance with claim 9, wherein the two spaced-apart grids are substantially parallel.

12. A panel in accordance with claim 9, wherein the nodes of the two spaced-apart grids
5 are off-set with respect each other.

13. A panel in accordance with claim 9, wherein the nodes of the two spaced-apart grids are aligned with respect each other.

10 14. A panel in accordance with claim 9, wherein the two spaced-apart grids each further include a third plurality of spaced-apart, elongated components, oriented transverse to the first and second plurality of components, and intersecting the first and second plurality of components at nodes.

15 15. A panel in accordance with claim 9, wherein the two spaced-apart grids have a thickness substantially the same as a thickness of the plurality of components.

16. A panel in accordance with claim 9, wherein the intermediate grid has a thickness greater than a thickness of either of the two spaced-apart grids.

20 17. A panel in accordance with claim 9, wherein the first plurality of spaced-apart, elongated components are longitudinal components; wherein the second plurality of spaced-apart elongated components are lateral components with respect to the longitudinal components; and wherein the two spaced-apart grids each further have:

25 a first plurality of diagonal components oriented transverse to both the longitudinal and lateral components and intersecting the longitudinal and lateral components at the nodes; and

a second plurality of diagonal components oriented transverse to the first plurality of diagonal components, and the longitudinal and lateral components, and intersecting
30 the longitudinal and lateral components.

18. A three-dimensional grid panel, comprising:

a) two spaced-apart grids, each having:

i) a first plurality of spaced-apart elongated components including continuous strands of fiber; and

5 ii) a second plurality of spaced-apart elongated components oriented transverse to the first plurality of components, and including continuous strands of fiber intersecting the continuous strands of fiber of the first plurality of components at nodes; and

iii) the nodes of the two spaced-apart grids are off-set with respect each other; and

10 iv) the first and second plurality of components being disposed in a layer having a thickness substantially the same as a thickness of the components; and

b) an intermediate grid, disposed between and interconnecting the two spaced apart grids, the intermediate grid having at least:

15 i) a first plurality of intermediate components, each extending between nodes of the two spaced-apart grids, and including continuous strands of fiber; and

20 ii) a second plurality of intermediate components, oriented transverse to the first plurality of intermediate components, and including continuous strands of fiber intersecting the continuous strands of fiber of the first plurality of intermediate components at nodes, each of the second plurality of intermediate components extending between nodes of the two spaced-apart grids